

REMARKS

Claims 1-20 are pending in the application. All the pending claims stand rejected. By the foregoing amendment, the Applicants have amended claims 1, 10 and 14. In view of the following discussion, Applicants submit that all pending claims are in condition for allowance.

In the Office Action on page 2, paragraph 1, the abstract of the disclosure was objected to as containing an extraneous word “comprising” in line 2. Applicants have amended the abstract and submit herewith a new abstract under 37 C.F.R. § 1.72. Applicants submit the abstract is now in proper form.

Amendments to the claims listed hereinabove are not made for purposes of overcoming any prior art.

Claim Rejections

35 U.S.C. § 102

On page 2 of the Office Action, paragraph 2, claims 1-2, 5, 10-11, 14-15 and 18 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,582,987 to Jun et al. (“Jun”). The Examiner stated as follows:

Jun teaches a microheater and method of fabricating the microheater for microfluidic devices comprising a microchannel 202 formed on a silicon substrate 201 and a conductor-microheater 214 formed in the microchannel 202 and comprising a metal layer 215 (col. 7, lines 10-17).

As for claim 15, Jun teaches etching of the substrate 201 (col. 6, lines 60-65).

Applicants respectfully traverse this objection.

Claim 1 as amended recites: a microheater for microfluidic devices comprising at least one microchannel formed on a substrate and further comprising a conductor disposed in said microchannel. Claim 10 as amended recites: a microfluidic device comprising at least one microchannel, said microchannel further comprising a microheater, said microheater comprising a conductor layer formed in said microchannel. Claim 14 as amended recites: a method for

fabricating a microheater for a microfluidic device comprising the steps of: providing a substrate; patterning said substrate; forming at least one microchannel in said substrate; and forming a conductor in said microchannel.

Each of independent claims 1, 10 and 14 require the presence or formation of a conductor or conductor layer in a microchannel.

The Jun reference neither discloses nor suggests the placement, formation or orientation of a conductor or conductor microheater formed in a microchannel. Rather, any conductor materials, to the extent they are disclosed in the Jun reference, form microchannel outer walls and are not formed in or inside a microchannel. (Col. 5, lines 7-13.) Any heaters in the Jun reference are disposed above the microchannel in polysilicon layers 103, 203 and 303. (Col. 5, lines 27-50; FIGS. 2G–2I.)

As a result, the Jun reference does not contain each and every limitation of independent claims 1, 10 and 14 as originally filed or as amended. Therefore, it cannot anticipate these claims. Claims 2, 5, 11, 15 and 18 depend from independent claims 1, 10 or 14 and recite additional features therefore. Thus, these dependent claims are also not anticipated and are allowable. Accordingly, Applicants respectfully request this rejection be withdrawn.

35 U.S.C. § 103 – Claims 3, 6-7 and 12 (Jun in view of Ferguson)

In the Office Action on page 3, paragraph 4, claims 3, 6-7 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Jun in view of U.S. Published Patent Application No. 2003/0209534 to Ferguson (“Ferguson”). Applicants respectfully traverse this rejection. Independent claim 1 as amended, from which claims 3, 6 and 7 depend, has been recited hereinabove. Likewise, independent claim 10 as amended, from which claim 12 depends, has been recited hereinabove. Applicants submit that neither Jun nor Ferguson, alone or in combination, teach or suggest the present invention as claimed. Moreover, Applicants submit there would have been no motivation to combine the references, and even if such combination were made, the claimed invention would not result therefrom.

The Jun reference relates to a method of integrating a high performance microheater or a microelectrode integrated on the top of a microchannel array structure, by either locally doping

impurities into the top surface of the microchannel outer wall or by depositing and etching an additional thin layer on the outer wall after the microchannel outer wall is formed; and forming electrical pads by depositing and etching a metal layer on the microheater or the microelectrode. (Col. 3, lines 1-12.) As further described in detail in column 5, lines 27-50 and referring to FIGS. 2G-2I of the Jun reference, a microheater or microelectrode is integrated onto the top of a microchannel array and not in a microchannel as the Applicants herein claim. Referring to FIGS. 1C, 1D, 2H and 2I of the Jun reference, microheaters 104 and 214 are clearly shown to be disposed over a microchannel region and not in any microchannel. (Col. 5, lines 27-50; see also, col. 6, lines. 27-37, e.g., “in accordance with the present invention, a polysilicon diffused resistor heater or a thin film heater is integrated onto the top of the microchannel outer wall.”)

Since the Jun reference does not disclose, teach or suggest a microheater disposed in a microchannel, the teachings of the Jun reference would not motivate one skilled in the art to look to Ferguson since the clear teaching of the Jun reference is to employ or dispose a microheater on the top of a microchannel outer wall. Indeed, the Jun reference teaches away from a conductor or microheater formed in a microchannel. A prior art reference may be considered to teach away when a person of ordinary skill upon reading the reference would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. *Monarch Knitting Machine Corp. v. Fukahara Indus. and Trading Co.*, 139 F.3d 977 (Fed. Cir. 1998). As a result of the teaching away of the Jun reference, there would have been no motivation for a skilled artisan to combine the Jun reference with Ferguson in order to achieve the combination suggested by the Examiner (which combination is in any event not the invention of the subject application, as is discussed in more detail below.) *In re Pavlecka*, 137 U.S.P.Q. 555, 557 (C.C.P.A. 1963).

The combination of the teachings of Jun and Ferguson result in a microheater disposed on top of microchannel having a substrate comprising quartz and borosilicate glass. That combination is not the invention of the Applicants. On this basis alone, this rejection should be withdrawn.

The shortcomings of the Jun reference have been set forth in detail. Nothing in Ferguson even remotely suggests the use or disposal of a conductor or microheater in a microchannel.

Accordingly, Ferguson does not remedy the deficiency in the Jun reference.

In addition, the Applicants request the Examiner provide evidentiary support for the contention in paragraph 5 regarding claim 3 with respect to the limitation of the conductor comprising an aluminum alloy with 99% aluminum and silicon and cooper, to the effect that the material used for conductor would be chosen by user having a desired result in mind. It is the Applicants understanding it is the Examiner's burden to provide a basis for such contention in making out an obviousness rejection.

The Applicants submit the subject claims are not obvious in view of the cited references. Accordingly, Applicants respectfully request this rejection be withdrawn.

35 U.S.C. § 103 – Claims 4 and 8 (Jun in view of Yamazaki and further in view of Ueno et al.)

In the Office Action on page 3, paragraph 6, claims 4 and 8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Jun reference in view of U.S. Patent No. 6,165,876 to Yamazaki ('Yamazaki') and further in view of U.S. Published Patent Application No. 2002/00224662 to Ueno et al. ("Ueno"). The Applicants reiterate their previous arguments hereinabove regarding the shortcomings of the Jun reference. Based on these shortcomings, i.e., the lack of any teaching or suggestion of a microheater or conductor disposed in a microchannel, a skilled artisan would not be motivated looking at the Jun reference, to look at the Yamazaki and/or Ueno references. Accordingly, Applicants respectfully request this rejection be withdrawn.

35 U.S.C. § 103 – Claims 16 and 17 (Jun in view of Yamazaki); Claims 9, 13 and 20 (Jun in view of Gaitan et al.); and Claim 19 (Jun)

On page 4 of the Office Action, paragraph 7, 8 and 9, the remaining claim rejections, i.e., claims 16-17, under 35 U.S.C. § 103(a) as being unpatentable of Jun in view of Yamazaki; claims 9, 13 and 20 under 35 U.S.C. § 103(a) over Jun in view of U.S. Patent No. 5,464,966 to Gaitan et al. ("Gaitan"); and claim 19 under 35 U.S.C. § 103(a) over Jun; all are based on the premise the Jun reference "discloses substantially the claimed invention." As set forth hereinabove in detail, the Jun

reference does not disclose substantially the claimed invention; indeed, the Jun reference is quite different from and, indeed teaches away from, the claimed invention. As a result, the remaining rejections under § 103(a) in paragraphs 7, 8 and 9 of the Office Action should be withdrawn since:

- a) there is no motivation to combine any of the cited secondary references with the Jun reference and
- b) the combination of the Jun reference and any of the cited references does not result in the claimed invention.

Applicants submit that all claims pending in the patent application are in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issuance are earnestly solicited. In the event there are any fees due and owing in connection with this matter, please charge same to our Deposit Account No. 11-0223.

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Respectfully submitted,

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